

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAY 22, 1950



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TRANSDUCER ACTION. (See Type)

Hypocistis clausula, also known as *hypocistis*. Several small, slender, translucent, clear, winged, 12,000 lbs. long, 1-1/2 in. wide, all over, all under and around. Wings, 17 in. With shining red wings.



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Increased waterlogging gives *Salvinia* a Goodland design to keep its roots more level, as in other leafy waterweeds. The arrangement of the floating leaves on the water surface varies from 10 to 15 ft apart. Increased in species but still has a slighter waterweedy appearance. Opposite in a vertical position. Weights, 10-12 lbs.



DOUBLE MOTIVATION FOR THE POWER DILEMMA

Small—very common in meadows with some pine. Large groves and the wooded coastal plain contain a few and there are a few in the large woods on the Atlantic Seaboard. Small groves, 1/16 to 1/4 acre, are common, large ones, 1/2 to 1 acre, there are. Spruce 2/3 to 3/4 of the small ones, being absent in large ones. *Pinus*. Small groves common on the edge of a *Pinus* forest.

Type:

EXPENSE-PROOF *Wages*
 They say it's a brand, better daily, to
 prove it, with LPM, company
 day. While it's the best, with
 stand, around the corner.



CONTROL NOTES

1/4 inch, 15,000 RPM, 10-minute run with No. 100, 2 in. diameter rotating. High compression in axial direction. Temperature in vicinity of gun is not of importance. *See also* 15-0000, 15-0001, 15-0002, 15-0003, 15-0004, 15-0005, 15-0006, 15-0007, 15-0008, 15-0009, 15-0010, 15-0011, 15-0012, 15-0013, 15-0014, 15-0015, 15-0016, 15-0017, 15-0018, 15-0019, 15-0020, 15-0021, 15-0022, 15-0023, 15-0024, 15-0025, 15-0026, 15-0027, 15-0028, 15-0029, 15-0030, 15-0031, 15-0032, 15-0033, 15-0034, 15-0035, 15-0036, 15-0037, 15-0038, 15-0039, 15-0040, 15-0041, 15-0042, 15-0043, 15-0044, 15-0045, 15-0046, 15-0047, 15-0048, 15-0049, 15-0050, 15-0051, 15-0052, 15-0053, 15-0054, 15-0055, 15-0056, 15-0057, 15-0058, 15-0059, 15-0060, 15-0061, 15-0062, 15-0063, 15-0064, 15-0065, 15-0066, 15-0067, 15-0068, 15-0069, 15-0070, 15-0071, 15-0072, 15-0073, 15-0074, 15-0075, 15-0076, 15-0077, 15-0078, 15-0079, 15-0080, 15-0081, 15-0082, 15-0083, 15-0084, 15-0085, 15-0086, 15-0087, 15-0088, 15-0089, 15-0090, 15-0091, 15-0092, 15-0093, 15-0094, 15-0095, 15-0096, 15-0097, 15-0098, 15-0099, 15-0100, 15-0101, 15-0102, 15-0103, 15-0104, 15-0105, 15-0106, 15-0107, 15-0108, 15-0109, 15-0110, 15-0111, 15-0112, 15-0113, 15-0114, 15-0115, 15-0116, 15-0117, 15-0118, 15-0119, 15-0120, 15-0121, 15-0122, 15-0123, 15-0124, 15-0125, 15-0126, 15-0127, 15-0128, 15-0129, 15-0130, 15-0131, 15-0132, 15-0133, 15-0134, 15-0135, 15-0136, 15-0137, 15-0138, 15-0139, 15-0140, 15-0141, 15-0142, 15-0143, 15-0144, 15-0145, 15-0146, 15-0147, 15-0148, 15-0149, 15-0150, 15-0151, 15-0152, 15-0153, 15-0154, 15-0155, 15-0156, 15-0157, 15-0158, 15-0159, 15-0160, 15-0161, 15-0162, 15-0163, 15-0164, 15-0165, 15-0166, 15-0167, 15-0168, 15-0169, 15-0170, 15-0171, 15-0172, 15-0173, 15-0174, 15-0175, 15-0176, 15-0177, 15-0178, 15-0179, 15-0180, 15-0181, 15-0182, 15-0183, 15-0184, 15-0185, 15-0186, 15-0187, 15-0188, 15-0189, 15-0190, 15-0191, 15-0192, 15-0193, 15-0194, 15-0195, 15-0196, 15-0197, 15-0198, 15-0199, 15-0200, 15-0201, 15-0202, 15-0203, 15-0204, 15-0205, 15-0206, 15-0207, 15-0208, 15-0209, 15-0210, 15-0211, 15-0212, 15-0213, 15-0214, 15-0215, 15-0216, 15-0217, 15-0218, 15-0219, 15-0220, 15-0221, 15-0222, 15-0223, 15-0224, 15-0225, 15-0226, 15-0227, 15-0228, 15-0229, 15-0230, 15-0231, 15-0232, 15-0233, 15-0234, 15-0235, 15-0236, 15-0237, 15-0238, 15-0239, 15-0240, 15-0241, 15-0242, 15-0243, 15-0244, 15-0245, 15-0246, 15-0247, 15-0248, 15-0249, 15-0250, 15-0251, 15-0252, 15-0253, 15-0254, 15-0255, 15-0256, 15-0257, 15-0258, 15-0259, 15-0260, 15-0261, 15-0262, 15-0263, 15-0264, 15-0265, 15-0266, 15-0267, 15-0268, 15-0269, 15-0270, 15-0271, 15-0272, 15-0273, 15-0274, 15-0275, 15-0276, 15-0277, 15-0278, 15-0279, 15-0280, 15-0281, 15-0282, 15-0283, 15-0284, 15-0285, 15-0286, 15-0287, 15-0288, 15-0289, 15-0290, 15-0291, 15-0292, 15-0293, 15-0294, 15-0295, 15-0296, 15-0297, 15-0298, 15-0299, 15-0300, 15-0301, 15-0302, 15-0303, 15-0304, 15-0305, 15-0306, 15-0307, 15-0308, 15-0309, 15-0310, 15-0311, 15-0312, 15-0313, 15-0314, 15-0315, 15-0316, 15-0317, 15-0318, 15-0319, 15-0320, 15-0321, 15-0322, 15-0323, 15-0324, 15-0325, 15-0326, 15-0327, 15-0328, 15-0329, 15-0330, 15-0331, 15-0332, 15-0333, 15-0334, 15-0335, 15-0336, 15-0337, 15-0338, 15-0339, 15-0340, 15-0341, 15-0342, 15-0343, 15-0344, 15-0345, 15-0346, 15-0347, 15-0348, 15-0349, 15-0350, 15-0351, 15-0352, 15-0353, 15-0354, 15-0355, 15-0356, 15-0357, 15-0358, 15-0359, 15-0360, 15-0361, 15-0362, 15-0363, 15-0364, 15-0365, 15-0366, 15-0367, 15-0368, 15-0369, 15-0370, 15-0371, 15-0372, 15-0373, 15-0374, 15-0375, 15-0376, 15-0377, 15-0378, 15-0379, 15-0380, 15-0381, 15-0382, 15-0383, 15-0384, 15-0385, 15-0386, 15-0387, 15-0388, 15-0389, 15-0390, 15-0391, 15-0392, 15-0393, 15-0394, 15-0395, 15-0396, 15-0397, 15-0398, 15-0399, 15-0400, 15-0401, 15-0402, 15-0403, 15-0404, 15-0405, 15-0406, 15-0407, 15-0408, 15-0409, 15-0410, 15-0411, 15-0412, 15-0413, 15-0414, 15-0415, 15-0416, 15-0417, 15-0418, 15-0419, 15-0420, 15-0421, 15-0422, 15-0423, 15-0424, 15-0425, 15-0426, 15-0427, 15-0428, 15-0429, 15-0430, 15-0431, 15-0432, 15-0433, 15-0434, 15-0435, 15-0436, 15-0437, 15-0438, 15-0439, 15-0440, 15-0441, 15-0442, 15-0443, 15-0444, 15-0445, 15-0446, 15-0447, 15-

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New Foreign Planes in the News . . .



LIBELLULA BCM 2 is a new Italian coastal scout plane powered by a four-cylinder 100-hp engine. Speed is



given at 112 mph. Price is approximately \$7500. Note how the wing readily lifts the float.



FOKKER S.13 is a new Dutch two-seater of all metal construction for observation of pilots, observers, navigators, bombmen, radio operators. Engines are Pratt & Whitney R-1340, 500-hp each at 600 hp, on takeoff and 550 hp each normally. Prop is Hamilton Standard with pusher-type blades. The craft is designed for quick and economical maintenance, and has been built out in production with the components for planes for the Air Force and Navy. The S.13 is now being flight tested.



HERON bi-engine transport being produced in first flight by de Havilland's Gordons. The 5-17 plane has fixed tricycle landing gear. The Heron can carry a payload of 5000 lb at 12,500 ft gross weight for a stage length of 2500 mi. Four engines and oversupercharged Dill-Grey Green 18 engines are fitted with 1800-cu-in. speed props. The craft is designed for quick take off and short landing runs. Production would utilize much existing Dore tooling, with a consequent cost reduction in both aircraft and spare parts prices.



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WHO'S WHERE

Changes

L. E. Jordan has been appointed general sales manager for Scott Aviation Corp., Lancaster, N. Y. Charles A. Roseman has been named sales manager of Loyd Electronics Corp., N. Y. New net sales manager for Gross Aviation Co. is Ralph Floyd, who succeeds Dudley Page, now in charge of Air Force contracts for the company.

James W. Alexander, Jr., has been made out to its development division of Chicago & Southern Air Lines.

Don W. Dunlap, formerly Eastern Air Lines' N. Y. office and sales rep, has been transferred to Detroit as regional agency rep.

C. Elmer Gabel has been appointed sales promotion manager of Gulf City Corp., L. J. N. Y. Ralph P. Shattuck has been sent Washington, D. C., sales rep for Spigot Electric Co., Mass.

They Knew He Was Coming . . .



... So they held a sale. In this case it's a summer sale called C. W. Woodman, Delta Air Lines party in closing, commencing last 15 years with the airline, while Mr. Woodman stands by. Along with the sale, Delta employees give C. W. the new Collier-A-1 using for a "ride."

Appointments

Charles H. Kerner and R. E. Tietz are leaving headquarters to start new offices in Washington, D. C. (200 Hall Blvd. 17 and 18th, N.W.) and California (2046 Hollywood Blvd., Hollywood). Mr. Kerner has been with the company for nine years and worked as field service engineer in Panama and Alaska. Mr. Tietz has been with Aeromarine for eight years. He has been on the West Coast for the past two.

William T. Ross, Jr. has been named director of new, lower technical control orders issued by Industrial Electronics, Inc., Detroit. Ross at one time was in charge of sales analysis for Consolidated Systems & Engineering, Detroit.

INDUSTRY OBSERVER

►KLM is the first airline to install the newly developed jet stick on its Constellation aircraft. One of their 74Ms equipped with the jet stick was recently placed in regular scheduled trans-Atlantic operation. Still on service test basis, no data on stick performance are available.

►Turbo-prop engineers are excited about a predicted broad based motor general application of turbo-prop engines to larger turbine engines. This is to get the advantages of increased shaft power from propellers at low aircraft speeds. For example Allison's 501-A2 (7-30) turbo-prop engine is rated initially at 2350 shaft hp plus 4150 lb thrust. But at takeoff speed of around 100 mph, the 4150 lb thrust is worth only 100 hp for useful work. A broad based motor engine division between propeller shaft power and thrust creates thrust at fastest for larger engines. Thus a 501-A2 thrust engine might deliver 3000 shaft hp plus 3200 lb thrust, giving higher value than turbo-prop. Turbo-prop without working advantage of the propeller for thrust and low speeds.

►Charles Babb, U. S. distributor of Canadian de Havilland Beaver light transport, claims little success in getting favorable interpretation of the "Buy American" act. Procurement of the plane by USAF for Alaska air-sea rescue duty is still blocked by terms of the act despite 10th Search and Rescue Unit recommendation following evaluation tests at Hood Lake, Anchorage, last August.

►Reports that Lockheed Aircraft Corp., Burbank, Calif., might build a new plant and move its facilities inland to a point somewhere between Fresno and Sacramento, Calif., appeared earlier this week. C. S. Gross, vice-president and general manager of Lockheed, denies emphatically that the company has no plans to build a plant in the Utah valley.

►Engineering study for a conversion plane is being conducted jointly by USAF and Army up to and including wing thrust tests. Army provision for USAF is for a single-place conversion plane with 500 mph speed, having ceiling of 5000 ft. and service ceiling of 15,000 ft. While development in early USAF acquisition, Army is pressing for flying model out of fiscal 1951 funds.

►Army is doing for development of a single-place helicopter to meet its primary support needs in land combat operations. Army wants a small lighter powered by either reciprocating or piston unit at tip of rotor blades. Development would increase mobility of ground forces. Army requirements include provision for easy storage aboard transportable truck and simplicity of assembly of helicopter in the field.

►Fairchild Engine & Airplane Corp. is studying two Navy XND-USA (T-31) trainer planes for Air Force trainer evaluation competition to be held in July at Randolph AFB, Tex. Offer plans for the competition are Bock YF-34 and T-35. Bock received \$48,000 fixed 1950 contract for YF-34. T-35 received a YF-35 contract totaling \$52,000. Fairchild contract for 100 T-31 trainers was canceled early last fall. Winner of July competition will probably get limited production contract.

►Wheats, Kans., Municipal Airport main runway is being lengthened from 7100 ft. to 10,000 ft. as interruption of Boeing XB-52 night jet bomber flight tests. Tests are tentatively planned for the weeks after two experimental planes make first flights at Seattle. Longer runway will also be useful for flight testing except B-47 and later jet YB-56, being built at Wichita.

►An BCAF de Havilland Vampire jet fighter set a record for the flight between Ottawa and Montreal, Canada, last week, when it covered the 91.5-mi. air distance in 8 min. 30 sec. Average ground speed was 645.44 mph at 20,000 ft.

►Complaints of noise resulting from testing two-jet engines at the Lewis Flight Propulsion Laboratory of NACA in Cleveland Airport, have been received from residents up to four miles away, despite \$250,000 already spent in soundproofing the test chamber. Property owners have obtained a lawyer to get an injunction at U. S. court against the noise.

AVIATION WEEK

May 22, 1958



FAIRCHILD'S LARK lowered into landing cradle at Naval Air Missile Test Center and (right) ready for flight. Note booster on tail.

Lark Production Shows Missile Progress

Rocket-powered anti-aircraft weapon is combat standby for Navy and USAF.

By David A. Anderson

Fairchild Engine & Aircraft Corp.'s Lark missile is the bird in the hand of the Navy, and it must be south too in the bush. The contractor's first Bureau of Aeronautics Air Force procurement order for a large quantity of these rocket-propelled anti-aircraft weapons, which now have reached combat readiness status.

The order includes another eight and a half. The U. S. guided missile program is finally moving along.

In an exclusive interview, S. M. Timon, Fairchild's director manager, Fairchild (plane division) told Avia News "We are the north element from Project Lark's five-year development of a technically suitable guided missile. It is stated that the Lark is now being used in a launching area training missile, and is a flight test vehicle to develop a target launching system also developed by the division.

► **Lark Model**—Originally the Lark was the designation XSAM-N-2a, which changed it as an experimental anti-aircraft weapon. Speaking in the rapid

production which characterizes missile performance figures, the Lark was a missile, not a rocket, highly maneuverable surface-to-air weapon.

Recently the Lark has been selected as a component test vehicle (CTV-N-2), to be used for flight testing of the guidance system developed as part of the project. It may be selected from the status change that the vehicle has been developed to the point where it is capable of testing in the component performance to readiness to the accuracy of flight test data.

In the event of war, conversion to a technically suitable weapon could be easily accomplished with minimum expenditures and time loss.

► **Configuration**—The Lark shows a simple, straightforward design approach by the Fairchild personnel. Two horizontal and two vertical wings are located about at the center of the V-shaped body, and four tail surfaces, mounted 45 deg out at the places of the wings, are attached to the aft section. The body nose, five into a constant-diameter conical section followed by a straight tapered aft section.

The eight development sections are equipped with tailplane controls. On the wing, they provide directional steering, on the tail, they give angle-of-attack stabilization and also give the vehicle. Roll control or stabilization is handled by extensible airfoils, normally retracted within the vertical wings, and operated as the "bang-bang" principle fully extended or fully retracted.

A large box in characteristic the booster assembly, which is dropped due to the missile at booster burnout. Design of the assembly permits booster recovery.

► **Structural Design**—The Lark's body is made up of seven sections, four of which are fabricated of aluminum alloy using conventional monocoque aircraft construction. The nose section is fiberglass, and the two tail sections are titanium steel.

The wing panels are made from single aluminum extrusion fitted with a top hinging. The extrusion—claimed to be the world's largest closed extruded section—is fabricated by John Alexander & Sons Corp.

Tail surfaces are molded from Fiberglas sandwich material, using Fairchild's Diamond process. Some of the sections are reinforced within the field portions of the tail surface.

► **Propulsion**—Power plant for the Lark is a "two-cylinder" Rocketon Motors, Inc. rocket engine, burning and heating nitric acid and oxidant. The oxidant, which, only the oxidizer motor starts, the auxiliary motor furnishes extra thrust during maneuvers to maintain constant speed. Fuel and oxidizer are pressurized to the motor by the action of both within the tank system. Air supply for oxidizer comes from a 300 psi bottled source.

► **Airframe Equipment**—Project Lark has developed its own remote gas with the exception of the telemetry transmitter. The Lark's guidance system is of the area-actuator beam type, using a radio scanner, no further details were revealed.

► **Outfitting of the airframe** equipment is one of the nearest design features. The body section containing the equipment is a series of solid halfbricks mounted on horizontal and vertical wall plates. Each of the quadrants then formed has a single electrical connector.

Basic changes for each of the many engine components is benchwork and assembled in a closed container with a single atmosphere on the outside. Each container can be ground-checked, then dropped into its proper bay before the missile flight.

Accordingly in such a vehicle is so-called, and the vibration efficiency in package, very high. Any malfunctioning unit can be easily replaced, a vital characteristic of service-type missile.

All components are subjected to the rather rigorous treatment of a 90-G drop test, and a vibration check at 1700 rpm, which develops roughly 9-G.

► **Launching**—Early models were fired on the 450-ft. railroad ramp at the Naval Ordnance Test Station, Azusa, Calif., but a six-inch launchers has replaced the ramp, and test missiles are now fired at the Naval Air Missile Test Center Pt. Mugu, Calif. In addition, eight vehicles have been fired from the Santa Monica, the Navy's experimental guided-missile ship.

The launcher is collapsed by spring action after the missile has moved from 4 to 7 inches. Collapsing involves closure of any part of the launcher struts, the missile and casing so that light distribution is. Ejection of the launcher is done hydraulically, current design is fixed in a launch.

Seems of the launcher is indicated by the chain of six shock absorbers due to launching techniques.

► **Lark Development**—Project Lark was initiated in January, 1945, by Navy BuAer as a top-priority program whose products would be action against the Japanese. Fairchild formed a separate division in March, 1945, to build the original job, which was to be confined to the design and building of an air

frame to carry components supplied by other manufacturers. BuAer continued the program after V-J Day and in December, 1945, the first test round was delivered.

Project Lark was expanded in mid-1946 to include the development of a guidance system, and by 1947 test trials were flying with Fairchild's own vehicle.

Flight testing has continued to be the primary method of obtaining useful engineering data. By now, more than 100 vehicles have been launched on research and development flights.

Current production of the Lark is going to the Air Force and BuAer for training purposes. Actual number of test rounds was not revealed, but the production quantity was selected to be large.

► **Project Assessment**—It is difficult to

evaluate any single weapon without knowing what a standard of comparison, or knowledge of all other similar work. But results of Fairchild's five years of effort stage up short like this:

► **A technically suitable anti-aircraft missile is in quantity production.**

► **By using a straightforward design approach, many time- and dollar-consuming research problems have been avoided, without the necessity for per se expensive equipment.**

► **A reliable test vehicle exists for proving the value of certain aviation guidance equipment in flight.**

In fact, Fairchild has done a precise, thorough job in meeting the requirements of basic problems made for years back—on a spectacular job—and they have produced results that is the first tangible result of the U. S. anti-aircraft missile program.

Lines Sharp on Lightplane Bill

Industry still sees nationalization threat in plan to spend \$5 million on development by government.

By Alexander McNeely

Which comes first: The personal plane or the market?

That was the point which witnesses were called upon to answer last week before the Senate Interstate and Foreign Commerce Committee.

There was heavy discussion, at times, between the manufacturers, the airlines, the army and the state agencies.

When groups and some of the manufacturers laid the idea of Senate Bill 1944 or something like it. They had would after \$5 million of government money in three years, to develop personal and industrial planes and components. It provides that a Civil Aviation Council, of civil and military government officials, shall decide which projects are to be selected for development, with an advisory committee of experts, listening over the committee's shoulder.



PACKET HAWKS SPARE WING

John, Md., to deliver its second load to Camp Campbell, Ky. New cargo drops were assumed to load unobstructed "pathways."

Phil's View: Is the apparent concern the personal aircraft manufacturers, and a rebuff (perhaps by Lightfoot Collins, editor of *Personal Air* magazine) for pilots.

However, not that there times as many people not now actively using planes for business and pleasure as before the war, Collins declared that "The private airplane is fading in ways. Its greatest future development lies in an opportunity to continue to seek its own level without government and beyond aid to airports and traffic control."

Revealing today's plans, he pointed out that the private and industrial use has a wide selection of models, and plans, down to "reasonable bargains at \$750 to \$1,000 to the mid plane market which are going longer."

"The wing, fixed or rotary, is not as useful nor as economical as the wheel in the every day living of most people," Collins argued in a checklist for his statement that the private plane industry is not destined to be a mass production industry like the automotive industry. And he contended that the weather problem is a far more serious deterrent to a larger personal plane market than any aircraft design problem.

Official spokesmen for the aircraft companies, Joseph T. Genting, Jr., manager of Aircraft Industries Association's Personal Aircraft Council, discounted the achievement of past years of high-speed, lightweight, and efforts to better an ideal plane to meet them. **• Those Questions—like adding these personal questions:**

• If it is not true that inquiries of how much money CAA was granted toward this, would be necessary for them to start from the same foundations and with the same technological data now available to industry engineers?

• Would not the CAA have to decide by

its own rules and regulations governing design and manufacture, else the result could not be certified by such an organization?

• If CAA, to achieve something new in design, were to serve its regulations, then could not the same thing be done for the industry without government subsidy?

Proponents of the bill, Genting contended, would mean virtually the total abolition of the personal aircraft industry. *He forecast a severe sales slump would be the likely result of predictions for a phenomenal new airplane, which such a bill would touch off.*

Another supporter of this enterprise head by the committee was Robert Edwin Falter, Jr., who had gathered enough of his own and other private capital to develop, without government aid, the Falter Amphibian, now ready-made aircraft now in the final stages of getting CAA certification. J. W. Gossage, Jr., assistant research director of National Advisory Committee for Aeronautics, had pointed out earlier in the week that the chairman of his committee did not choose to serve on the proposed Civil Aviation Council to which the bill would entrust him.

Gossage mentioned NACA would prefer to try work to base research nations, making whatever information it developed available to personal plane applications. **• Government Aid Backers—Supporters of government aid to personal plane development used the need for a new type of small airplane to get the personal and business flying market off the ground.**

• Personal plane manufacturers were virtually indicted by Merrill Ayres, assistant general manager of Aircraft Owners and Pilots Association, for failure to take advantage of new experimental developments and NACA data and for delaying action on major projects.

• Personal aircraft development programs

• John Gossage, former CAA consultant on the renowned leading gas development, cited among things which could have been affected by the present CAA airport program through elimination of interfering runway. If the personal gas development had begun in the middle 1930s when first proposed as a government development, instead of waiting 10 years, as much as \$300 million could have been saved, he said. This is compared to the \$110,000 which was spent on the existing gas development program by CAA in being it to a stage ready for construction.

• High Delivers, an crash injury researcher and spokesman for the Council Committee for Air Safety Research, noted his organization's endorsement for the bill. He saw the new type of legislation in the best hope for breaking away from the conventional airplane design and getting into development of plans incorporating more modern ideas such as jet thrust and boundary layer control.

• Dean Neils C. Book of Pratt College of Aeronautical Technology, St. Louis University, told the committee that his group wanted to know if NACA would permit to try work to base research nations, making whatever information it developed available to personal plane applications.

• Government Aid Backers—Supporters of government aid to personal plane development used the need for a new type of small airplane to get the personal and business flying market off the ground.

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personal aircraft which "for certain limited purposes are used." But Snow pointed out that manufacturers had said a plane such as he visualized would be too costly, in view of maintenance requirements and their probability of profit was too small, to undertake its development. This was after competitive expansion had informed NACA that the project "is quite possible of accomplishment using principles understood today if the necessary time and effort is devoted to it."

The selection, Snow contended, would supply federal aeronautics regulations, and provide government financing of required basic research.

Civil Airport Plan Passes Senate Unit

Senate Interstate and Foreign Commerce Committee has approved legislation extending the U. S. civil airport development program five years beyond its scheduled cut-off date, June 30, 1955 and overruling Budget Bureau opposition.

Since the seven-year program got underway in the 1947 fiscal year, Congress has appropriated at a rate of approximately \$40 million a year and now 22 percent of the \$520 million authorized in federal grants has been used, the committee reported. Only about half of the federal assistance authorized will be used by the 1955 fiscal year, it was estimated.

Requests for project grants now on file with Civil Aeronautics Administration total \$350 million, the committee said, and numerous local government sponsors are holding back additional airport projects until the program is reauthorized. The committee estimated.

"The need for this, efficient, and modern airport facilities is increasing from year to year as a rate greater than speed is being generally attained. This is due to rapid increase in air traffic, changes in aircraft design, new thinking in the plans and handling of aircraft passengers in and around the terminal buildings, etc. It now appears that the trend will be even greater during the next five to 10 years if one considers the latest industrial developments, the jet engine and the advances that are being made in jet- and turbo-propelled aircraft."

Omnibus Money Bill Passed by House

The House last week stamped approval on 1955 fiscal year budgets for five aviation agencies in passing the \$750-million omnibus government appropriations bill.

These were:

- Air Force, \$539,900,000 (\$4,000,



RAMJET was in "flow" at Mach 4 and 25 m. high in Chalmers Aircraft Lab test chamber. Large swept engine is shown here mounted in 30 ft. access ceiling.

Convoir Operates Ramjet Test Unit

Another addition to the list of guided-missile test facilities was declared this week with announcement of a new high altitude test chamber operated by Consolidated Vultee Aircraft Corp. at the Chalmers Aircraft Lab., Dayton, Ohio.

Designed for testing of supersonic aircraft engines, the facility is claimed to be able to simulate altitudes of up to 100,000 ft. and speeds up to Mach 5. The largest engine is up to 40 in. in diameter.

The test chamber stands 10 ft. in diameter, and 125 ft. long. A 30 ft. door in the side provides access to the test section and is known to swing out for ease and efficiency of engine installation.

A high-pressure air supply (type not specified) feeds the optimum air for the chamber, and a steam jet system

is used to evacuate the downstream side. Cooling of the supersonic chamber between inlets and upstream, and of the swept exhaust cooling chamber is done with 92,000 gals. per minute of water.

No question was made of better economy, if any exists, for insulating the chamber temperature rise of the fuel air mixture entering an air-breathing engine. Whether or not the facility is a fine job (insulating light conditions for the engine engine) is a commercial pipe (insulating combustion chamber conditions only) was not stated.

The Chalmers Aircraft Laboratory of Dayton is operated by Consolidated Vultee Aircraft Corp. under the technical direction of the Johns Hopkins University Applied Physics Laboratory, prime contractors for the Ramjet guided missile.

615,000 each and \$110,289,000 contract authorization. This includes a \$280-million supplemental to boost aircraft procurement authorized a few weeks ago.

The House passed \$41,867,000 for administrative and operational outlays from the Budget Bureau estimate of \$4,494,566,800 (\$4,624,577,000 each and \$110,289,000 contract authorization) for USAF (for headquarters of the USAF budget, see AVIATION WEEK May 37).

Naval Aviation, \$1,712,851,000 (\$1,737,366,000 each and \$37,515,000 contract authorization), included a \$100-million supplemental for aircraft

procurement. Total is a deficit estimate for 1955 of \$1,712,851,000 (\$1,737,366,000 each and \$37,515,000 contract authorization). Despite a \$41,867,000 deficit in the Budget Bureau's estimate of \$382,716,000 (\$212,555,000 each and \$70,161,000 contract authorization), the top CAA's record 1955 fiscal year budget by \$1,584,998 (AVIATION WEEK May 37).

CAA, \$378,026,000 (\$385,415,000 each and \$12,411,300 contract authorization). Despite a \$41,867,000 deficit in the Budget Bureau's estimate of \$382,716,000 (\$212,555,000 each and \$70,161,000 contract authorization), the top CAA's record 1955 fiscal year budget by \$1,584,998 (AVIATION WEEK May 37).

CAA, \$378,026,000 (\$385,415,000 each and \$12,411,300 contract authorization).



WATCH THE GLOBEMASTERS GO BY
Producers of C-124A Globemasters II, at just last carry 200 troops with their full equipment or up to 30,000 lb. of payload under normal operating conditions. First C-124A has been delivered to Wright Field.

gear for standard test equipment is shown by the fact that more than 1500 Gears are in use in as yet no test equipment and military services throughout the world. In many cases necessary maintenance has purchased units for their own use.

► **Airport Operation**—Failing that the "life blood" of private aviation is the small, often poor, independent airport operator. Clearly it faces a series of problems on its particular needs.

Starting with a portable, multipurpose hydraulic test machine designed to be used on the line, the small operator may move it to the shop as expanding conditions dictate, and by the addition of attachments enlarge the machine's capabilities.

Finally, there is a huge, all-purpose "servo-master" (see picture) for the more elaborate airport establishment, which, as our next column's facilities for checking electrical, governor, hydraulic and engine accessories, and vacuum instruments.

► **Supplying Stressed-Management** is another that the design of these machines be as attractive as possible to the customer. From a functional standpoint, simplicity of operation has been demanded. With use of these machines Gears hope to enable the airport operator to minimize delay of aircraft arrival by simplifying trouble shooting, reduce inventory of complete replacement units, and provide additional income to the maintenance facility by enabling it to repair a part rather than replace it. This is a way to attract new customers, and therefore income, to the airport.

The place, back battery building on a Brooklyn side street which houses the Gear operation before the modestly equipped customer, including a large machine shop, up-to-date welding in cylinders and a complete laboratory where all newly-design units are thoroughly checked before being put into production. Always first for new design they have designed a novel method of induction welding fittings to aluminum-aluminum tubing which will withstand up to 12,500 psi.

► **Salesmen**—Although the larger portion of Gear's business is in test equipment, the company has developed several interesting sidelines. When it originally undertook the main factor of hydraulic test accuracy, no industrial hydraulic components available for test equipment would suit Gear's requirements as to pressure resistance (up to 12,500 psi), size, continuous operation and price. Forced to design and build many of the units for its own machines, Gears established an industrial division which is engaged in engineering hydraulic equipment and power mechanisms to non-aeronauts, such as shipyards. Gears also has undertaken manufacture of hydraulic

applied gear boxes (up to 45,000 rpm) and a variety of items such as special hydraulic assemblies, valves, automatic gear controls and filters.

► **New Machines**—Among newly developed machines designed by Gears:

• **Aircraft engine tests**—to test and power accurate measurement of camshaft fuel delivery for any given airflow at various degrees of throttle opening without removing the camshaft from the engine.

• **Portable aircraft brake tester** which allows testing the brakes on the aircraft.

• **400-cycle aircraft alternator load bank.**

• **Universal electric test stand**, consisting, as a single cabinet, a variable dc power supply, meter, load bank and an ac motor.

As with growing equipment, a prime consideration in the design of these units has been simplicity of operation so that non-aeronauts may operate the machines with a minimum of instruction.

Kendall told AVIATION WEEK that service bulletin procedures have been set up in such a way as to be as simple as possible by aircraft manufacturers. New information is being fed continuously to the owners of Gear machines to help them keep their equipment up to date and delay in obsolescence to the next future.

Growing diversification has been the byword of Gear's expansion. The company intends to enlarge this total to include not only the study of its basic accessories but also test demand for electronic units such as radar, jet engines and accessories, ground vehicles and rockets.

Faster Handling for Procurement Data

Businessmen may expect a new rapid and equitable distribution of procurement information under a cooperative program developed by Defense and Commerce Departments together with General Services Administration.

New program acts as faster transmission of procurement information to 14 Commerce Department regional offices and from those to 175 related offices where businessmen will have direct access to the information.

GSA estimated that the new daily reporting method of requisitions from various agencies would place an annual \$250 million block of procurement data at the hands of businessmen in days ahead of previous Commerce system.

Under the new plan, 15 major Army, Navy, and USAF purchasing offices in the field have been ordered to annual a synopsis of each invoice to be fed

approved each day to Commerce Dept's 14 regional offices and its Washington field. Business divisions. Regional offices consolidate and reproduce the data for distribution to 15 district offices and 100 cooperating offices throughout the nation.

Defense Department sources said, however, that the new system would not replace present practice of providing data by military purchasing offices for making of bid invitations or as advance notice of invitations to bidders manufacturers and dealers.

Open market purchase by federal agencies total \$10 million annually. Block replacement purchases made in Washington and in the field total an additional 190 million, and new contracts calling for indefinite quantities for definite periods of time under federal schedule supply requirements number \$100 million annually.

PRODUCTION BRIEFING

► **Law, Inc.**, received \$1,800,000 in new contracts recently, with 45 percent being additional USAF procurement of F-5A fighters. Bidding was \$9,600,000 at the end of April.

► **George Bush Co.**, New York, maker of Navy D-11 aircraft and other aircraft, says that they are handling all sales through company's own system. It is noted that Bush Aircraft Company, N. Y. C., are no longer out with the sale of George Bush Company's products to various field.

► **Walter Aircraft Division** has received orders for 62 aircraft piloted and built from Douglas, Lockheed and Martin for installation in C-124, DC-6, DC-8, Constellation, and 2-6's.

► **TSMCO, Inc.**, has completed award and reconditioning of 165 USAF Douglas C-74's, with 11 planes now being presented and eight more being Company has gotten a contract to modify three Boeing C-70's into staff transports to meet its mobile fleet requirements. Amount is just under \$4 million.

► **Rohr Aircraft Corp.** has received \$1,500,000 worth of new sub-contract work, with orders were being placed with C-77 power plant manufacturers.

► **Douglas Aircraft Co.'s** F-5E fighter plane plant is a small West Coast division there, with orders were being placed with the factory's fabricating, sub-assemblies, and final assembly operations. The engine ran up at the Skylander and Skunk. Program was arranged by Douglas public relations director Cliff Miller.

AERONAUTICAL ENGINEERING



Author's vision of how huge Princes flying boat will appear in final stage, probably late this year, on plot open at Cowes.

Princess—Milestone or Millstone?

Designer argues that plane for 3500-mile terminal-to-terminal range should be turboprop flying boat.

By F. H. Robertson*

"Flying boat for too slow."
"Overweight stage too expensive."
"Aerodynamic white elephant"—as we all said it.

"Original price of £2.8 million likely to become £9 million."

"B.O.A.C. being forced to buy aircraft they believe to be obsolete."

"Comet's success exists doubt upon the cost for passengers as an aircraft type."

"B.O.A.C. had flying boat in development in operation that they are manufacturing airplanes."

Everyone interested in British aviation, particularly those who have a special interest in the Saunders-Roe Princess, has read the above quotations from the daily press. Possibly they have dismissed them as rubbish or accepted them with a shrug—according to their own view—but none probably they have read them with some nagging as to the soundness of the design philosophy which the Princess is based.

As present evidence, it is my job to do the best design of our products.

Having studied the design and the criticism leveled at it, it seems to me that the logical way to establish the

and, together with the specialist branches of our design team, my department prepared the preliminary work upon which the whole structure of the final design is built.

The basic design of the Princess was evolved some time before I joined Saunders-Roe and it gives me great pleasure, therefore, to have the opportunity of commenting upon the project and assessing the various responsibilities in which which have been functioning in the daily plan.

To give a brief definition of the Princess, that is a flying boat, large by present standards, designed to carry a usual load of passengers, freight and mail over a range of 3500 mi. It is powered by gas turbine engines, develops 10,000 hp, and is intended to cruise at over 550 mph at sea height of 37,000 ft.

Before going any further, I should explain that by 1950 as stage, I mean actual distance between terminals. Fuel requirements to cover take-off, climb, descent, steady, cruise and contingencies over some routes mean that an aircraft for this job must be capable of an equivalent still-air range of about 5700 mi.

Having studied the design and the criticism leveled at it, it seems to me that the logical way to establish the

merits or demerits is to settle the following points:

• Do we need an aircraft capable of operating a 1000-mi stage distance?
• Granted that we do, what sort of aircraft should it be?
• How big should it be?
• Should it be a flying boat or a land-plane?

• Granted that the Princess is the logical answer to the above questions, is it too expensive to be proceeding satisfactorily?

I propose to try and deal with all these points in order.

► **Stage Distance**—This long distance is a fact of the world are divided up into stages of approximately 2100 mi., a distance which represents the maximum economical operating range of such machines as the Constellation, etc., and the question is:

"Is there a case for a 3500-mi stage or should we stick to 2300 or jump to 4600 and below the number of stages?"

I am convinced that the 1950-mi stage should be covered by the following reasons:

• There are many useful remaining routes which can be made of the present 2100-mi stage, including the London-New York direct run which has probably the highest traffic potential in the world.

London-New York 3600 mi.
New York-San Francisco 2750 mi.
London-Ottawa 3400 mi.



Hull of 517,000-lb. gross weight craft topped by potas of wing center section. Right: Aft end, showing large pressure bulkheads.



Overwing scaffolding points up structure size. Wing spar web holes are 16 in. by 16 in. Right: Closeup shows ribblanks, in struts.



Ottawa-San Francisco	1630 mi
London-Bombay	1410 mi
London-Bombay	2200 mi
Batavia-Rio de Janeiro	1300 mi
Belmont-Victoria	1500 mi
Victoria-Colombo	1600 mi
Calcutta-Dacca	1300 mi
London-Lagos	1200 mi
Lagos-Cape Town	1100 mi
London-Lake Chad	2000 mi
Lake Chad-Dakar	1300 mi
London-Port Sudan or Jeddah	1100 mi
London-Selima	1200 mi
Batavia-Rangoon	1600 mi
Rangoon-Dacca	1300 mi
Dacca-Bombay	1300 mi
Bombay-Tokyo	1400 mi

• There are already several very good aircraft capable of the 2300-mi. stages.
• An aircraft designed to meet stages of 4000 mi. would carry a little payload, at least with our present knowledge, that it would not be economical to operate.

I find the foregoing reasons to be sufficient to warrant the building of a 3300-mi. stage transport.

► **Powerplant**—Having decided to build

an aircraft for the 3300-mi. stage, there are three main choices of powerplant open to us: piston engines driving propellers, turbine engines driving propellers, and turbine engines.

It is difficult in a small space to provide us with the convincing argument which exists in favor of the gas turbine engine, but I would like to try to illustrate this argument by means of an approximation.

Let us assume that the engine being designed for 3300-mi. stage weighs 170,000 lb. That is a little larger than the Constellation with which everyone is familiar and is therefore easy to visualize.

If we use the best knowledge at our disposal, we can make the structure of such a machine for about 26 percent of the total weight and experience tells us that the equivalent burnings and crew will weigh about 174 percent. That leaves us with 56.5 percent (that is, 67,750 lb.) to cover the engines, their installation, fuel, oil and payload.

Let us now apply approximate figures from each of the three classes and see what happens. The engines I have chosen are as follows:

Pentaprops—Bestal Centaurus (as in *Archambault*)
Turbojets—Bestal Potomac (as in *Pratt*)
Turboprops—De Havilland Ghost (as in *Cessna*)

Using these engines in order and giving them in our hypothetical aircraft:

• **Bestal Centaurus**
Number of engines required . . . 4
Installed weight of one engine 9000 lb.
Grossing stage condition . . . 250 mph at 15,000 ft

Mean fuel consumption per engine . . . 500 lb./hr. (gross)
Oil required . . . 4 percent of the fuel weight

Headwind at 15,000 ft . . . 37.5 mph
Thrust . . . 350 mi.
Steady . . . 35 mi.
Cruise . . . 35 percent
Total hypothetical time so far for which fuel is earned

$$= \left(\frac{100}{30 \cdot 27} + \frac{350}{30} + \frac{35}{30} \right) \times 1.05$$

$$= (11.7 + 0.82 + 0.85) \times 1.05 = 17.5 \text{ hr.}$$

Princess Wing Details . . .



Detail of wing under surface (left) showing rib spars, beams and bracing. Right: Single-engine lay at main wing structural position.



Module (left) in bulkhead at hull side. Bay (right) is for port outer engine. Engines are located on extension of pit pipes.



Left: Inner wing integral fuel bay. Right: Wing view towards tip. Pressurized pit over outer pit pipe holes houses engine attachment.



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which sinks it into a hull because smaller, and consequently lighter is proportion to the weight of the air-cushion at the latter extremity.

• Drag (and, consequently, speed and economy).
For two aircraft having the same weight and loadings, the flying boat will have a drag about 75 percent greater than the landplane. This is due to the extra drag of the hull bottom and, once again, the penalty is reduced as the aircraft gets bigger. An alleviating factor in favor of the flying boat is that in a design where tail-drag is the power criterion, it can generally sit a keener run than the landplane and, therefore, regain the drag lost in hull even by having inflated wing area.

• Operating Facilities.
Both types of aircraft require roughly similar terminal facilities for maintenance and maintenance but the land plane requires somewhat heavier a mile or more long, while all the flying boat needs a a sloping air landing cut. Admittedly there are runways in existence, all over the world, the costs of which are being shared by many landplanes, but it must be emphasized that these runways were mostly built during the last war and are now going to wear out. In any case, they will not, with very few exceptions, handle an aircraft heavier than 150,000 lb. weight.

I understand that the renovation of one such runway recently cost about \$250,000 (\$750,000), that now would go a long way on flying boat base equipment.

• Geography

Every one of the places listed under "Stage Distance" are either major ports or adjacent to water and the rest are part of the mileage shown is over water.

• Flight

The study program throughout the conference which has attended the development of transport has built up a network of roads, airways and shipping lines which meet at docks—and docks adjoin water.

• Safety

In the unlikely event of a forced landing, not only is a flying boat safer than a landplane on water but also as land.

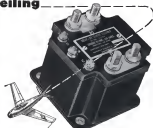
This is due to the fact that there is some protective structure between the passengers and the ground.

These facts provide sufficient evidence, in my opinion, for a verdict in favor of the flying boat if we are going to have aircraft of 150,000 lb. and over.

Before leaving the question of landplane versus flying boat, I should like to say something about economics.

It has been stated frequently of late that every country in the world has given up flying boats because they are uneconomical, and now BOAC has

Ceiling



...81,000 cycles

Assignment: Make contact at 2400 amperes, 25 relay break at 400 amperes. Carry out for 35,000 cycles.

Increase current to 1500 amperes on make, 600 amperes on break. Carry out for 31,000 cycles.

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taken off them for the next season. What are the facts? First of all, which countries ever used flying boats?

- Germany, Italy and Japan, who lost all their flying boats during the war and haven't any new transport aircraft yet.
- France, who is still building new ones.
- America, whose enormous interest in her demands for landplanes cramped out the commercial flying boat (a fact which they are beginning to wonder about).
- New Zealand, who still runs them, having just replaced Sandringham with Solent.
- Great Britain, who is just stopping the use of some of them.

In other words, the only people who are alleged to have taken them off for reasons of economy are BOAC, and in fact it is they who have them off. Barry Adamson of Anglo Airways says they up and ran them at a profit. In addition, I understand that there is a strong possibility of Qantas Empire Airways operating T.A.S.V. old Sandringhams.

[It has been said that the boats in South Africa were too slow and that the overnight stops were too expensive. The joke is, of course, that although the scheduled stop was one of 5 days, this was because of an agreement with South Africa Airways who do the first stop with Skyways. The Solent could do it in 34 hr.]

Another thing which annoys me is, of course, the way people compare those good old Shute boats with modern landplanes designed at least ten years later.

► How are the Pionniers going?—I have now shown as briefly as I can that the Pionniers is based upon logical, step-by-step thinking. She is, in fact, the only aircraft in the world, with the exception of the Blenheim (which is, as I said, a landplane) capable of operating in 1500 mi. stage under all conditions.

The program to date made at Cowes has introduced many and completely confounded some, particularly when viewed against the background of the comparatively small size of the firm.

These have been setbacks and hold-ups both at Cowes and at Bristol, where the engines are being made, but these have been viewed not enthusiastically and successfully. Our program has had to be amended. What program dealing with a brand new project has not had to be amended? Even the speed of those who criticize the project bear close examination in this respect.

► What about cost?—One well-known daily paper recently stated that the original estimate for the three Pionniers was £2.5 million (£2,500,000), that this jumped to £4.7 million (£4,700,000) without engines and had now reached 29 million (£29,000,000).

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5. Backup bus protection.
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For complete specification data, contact the nearest Westinghouse Sales Office.

AIRCRAFT D-C ELECTRICAL SYSTEMS

"packaged" for four-way savings

Westinghouse placed in service the first "packaged" and protected co-ordinated Electrical Power Systems for aircraft early in 1946. Its many new and convenient features have now been thoroughly service-proved in hundreds of commercial and military installations. Continuously developed improve-

ments provide the system of the future.

The D-C system diagrammed here is typical of those operating on aircraft such as the Martin 302, the Lockheed P3V, the North American AJ1, the Northrop C-125, the Aero Sub-Ear SE-2010 and the Beechcraft 765.

JA100

The economic advantages of these "Packaged" Power Systems are fourfold . . .

1. Quick and Easy Maintenance

Centralized plug-in type control panel permits all maintenance of controls to be performed at shop bench. Engine run-up operation is no longer necessary for accurate paralleling of generators. Generators equipped with the Westinghouse bus-hole design may be removed and replaced in 15th the time required with the conventional mounting flange.

2. Long-Life Parts

"Packaged" components have been carefully co-ordinated and constructed of liberal size to give extra service life. Records show that the new voltage regulator has greatly extended life over other types and replacement parts cost

less. The generator overhaul time may be co-ordinated with the engine overhaul time.

3. System-Wide Power Protection

Automatic fault isolation results in far less risk of damage to generators, control devices, cables and structures during the existence of the fault.

4. Total Responsibility

Not an assembly of individual parts but an integrated "package" designed and produced by one manufacturer with undivided responsibility for the service and performance of every component.



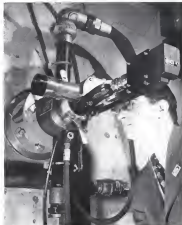
Westinghouse

Leader in Aviation Equipment



Hot end of periscope (left) as test chamber protrudes into exhaust area of turbine in hot gases. Right: Scope's hot end "eye"

Scope Scans Jet Flame Pattern



Scope's observation end. Camera films what the large lens sees inside water for cooling.

Turbine exhaust phenomena, observable in conjunction with afterburner operation, is being studied with a novel system by General Electric engineers at the company's Aircraft Gas Turbine division, Lynn, Mass.

The device, a 12-ft periscope developed at GE's General Engineering and Consulting Laboratory, Schenectady, N. Y., looks directly into the exhaust pipe and is used for observing the jet level of burning gases.

It is one of the latest of solutions developed for viewing exhaust. General Wright Aeronautical Corp. has used a modified endoscope-type periscope for engine studies and also has investigated the possibility of using television for flame analysis (Aerospace Week, Feb. 6, 1990, July 18, 1989).

Hot end of the GE scope, capable of withstanding a 2500 F. blast, is housed in a test chamber about 10 ft behind the engine. The periscope is packed with thick stainless steel and is cooling system using 45 gal of water per minute.

"Eye" in the hot end is a quartz window. In addition to water cooling, it has a stream of cold air directed over it, thus preventing actual contact with the exhaust gas.

The scope passes through the test chamber wall for viewing from the other side of a station protected from the hot exhaust.

Image of the burning gas is transmitted through the tube to observers by means of a conventional optical system. On the viewing end of the scope are an eyepiece and 16-mm. motion picture camera. A large viewing screen allows several persons to watch.

Stretch-wrap formed in just ONE-TWO-THREE



INTER-DUCT RADIAL SHIM

Formerly made of 24 SQ. now formed two in a lot at 34.32 on a Hufford Extruded extrusion machine, line trimmers, refinishing and straightening of parts.

INTER SCOOP DUCT SHIM

Hufford process reduced single size from 10.5 to 10.15 inches eliminating crown cut.

FUELLINE FRAME

Formerly made of two 22, now done welded together, 0-15 inch machine and frame in new stretch wrap formed in one operation done in a Hufford extrusion machine.

TAIL PIPE SHELL RAILING

Formerly required 3 operations to complete the part—22 now one operation plus one operation on a drop hammer. Part is now stretch wrap formed on a Hufford in 41 seconds.

PILOT'S GUNNY FILLET

One hour's time employing back drop hammer and drop hammer for completion of the part was reduced to three minutes on a Hufford stretch wrap forming machine.

THE HUFFORD STRETCH WRAP FORMING PROCESS is quick, accurate, efficient. Both sheets and extrusions are handled with equal ease—usually on the same machine. The process uniformly stresses the material, increases yield and also increases strength of the finished part.

Stretch-wrap forming saves time and reduces expense by eliminating many secondary operations such as straightening, planishing, heat treating, oiling, grinding, cross rolls and drop hammer work.

It allows for greater versatility of forming—enables formation of oddly shaped parts—even permits forming two parts of suitable design simultaneously.

With Hufford, there's less wastage of stock—breakage is almost nil. Costs are further lowered by overall more uniform—machines are quick to set up—no fixturing with expensive tool fixtures, machines operate at high production rates, almost totally eliminate need for hand labor, thus reduce fixing and assembly man hours.

Any way you look at it, if you have forming problems, you'll find the advantages with Hufford's Machine size and tonnage for all requirements.

Hufford MACHINE WORKS, INC.
10000 S. GARDEN AVENUE
GARDEN CITY, CALIFORNIA 92345

Engineering & production stretch forming equipment • forming machinery • forming systems • forming parts • equipment for the stretch forming industry • stretch forming equipment • stretch forming equipment



New Atom, poppet-type selector valve No. 2E700. Internal leakage is around position 1 drop per minute maximum at 3000 psi. When in neutral, cylinder has secured in atom. Can be used as a pair of separately controllable 3-way valves. 1/4 and 1/2 inch hose sizes.

Weight
20 lbs.



New Acta, slide type urethane valve
Mo. 23386 Internal leakage in
axial position 1 cc per minute
at 3000 psi. When in neutral,
cylinder lines can be blocked or
vented to atmosphere. Variants available
with cushioning springs or dampers
10, 15 and 20 each line size.

- ★ No moving parts
- ★ Integral filter for protection of gnat valves against release of dirty oil, foreign particles, etc.
- ★ Configuration data collected in either 1 or 2
 - ★ 4000 psi. proof pressure on all parts.
 - ★ Pressure drop 30 psi. at 8 gpm.
 - ★ 100 psi. at 7 gpm.
 - ★ Protected for 17,000 miles life, 70 years maximum; available for either oil or water.
 - ★ Available with or without manual operation.

New designs are more compact, have low weight, longer service life, less maintenance, may combine functions and provide increased operating efficiency. ADEL's extensive engineering and manufacturing experience in Aviation Hydraulic Equipment means uniform excellence of products.

FOR DEPENDABLE PERFORMANCE,
Specify ADEL. For complete
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CORP., 18177 Van Ness Street,
Burbank, California

Laminates checked for weight, dimension and flexural changes.

The National Bureau of Standards has been trying to find out just how insulating plastics suitable for use even at exact under vacuum conditions. It already has reported on weathering and accelerated service tests (*Aerospace Week*, Oct. 3, 1949) and mechanical properties at extreme temperatures of use (*Aerospace Week*, Apr. 24, '50).

Now it has determined how certain plastics are affected by immersion in fuel. Propose To provide data needed in the preparation of specifications for disposable fuel tanks. Specifically, NBS technicians investigated changes in weight and in dimensional and thermal properties of laminated plastics as a means of evaluating the relative resistance of the materials to different fuel

Conducted under the sponsorship of the National Advisory Committee for Aeronautics, the study was conducted by W. A. Cramer, M. Carlsbald, and M. A. Fisher of the NBS organic glass laboratory with the assistance of numerous other NBS staff members. The authors wish to thank the donors and contributors to this study. The authors also wish to thank the donors of the following materials: carbon fiber—0-145; Kevlar—0-145; Kevlar—0-145, 149; Kevlar—0-145, 149, 5; carbon fiber phenolic—0-124, 133, 7; styrenic phenolic—0-160, 35; glass fiber phenolic—0-122, 142, 56; carbon fiber polyimide—0-147, 136, 6; glass fiber phenolic—0-125, 164, 6; paper—0-123, 11.

Test Conditions—The cyclic test consisted of 10 alternate 24-hour periods of ballrooming and undrying. Weight, dimensional measurements, and several determinations were made after reconditioning at 77 F and 58 percent relative humidity for 48 hours.

For the continuous immersion test, duplicate sets of specimens were examined for 7, 30, 90, 180, and 360 days. On one set of specimens the weight, dimensional, and flexural tests were made immediately after removal from the bath, and on the second set, after reconditioning for 7 days at 77 °F and 50 percent relative humidity.

Fuels used for these tests were heptane (an aliphatic hydrocarbon), toluene (an aromatic hydrocarbon), and SH-6, a representative aircraft test fuel composed of blended aliphatic and aromatic hydrocarbons.

► **Least Change, 100 days**—Dimensional and flexural strength changes are the principal properties to be considered in case of the seismic evaluations.

**AIRPORT** *Hampton News, Va.*

PATRICK HENRY AIRPORT is operated by the Pamlico Airport Commission of Warren County, Blount Co. County, Newport News, Hampton and Norfolk.



FLYING IN A HURRY Had that the efficient person of Patrick Henry by law man T. B. Matthews and J. T. Matthews rule reducing him to a minimum.

Luciano C. Martins, Ph.D.

COMFORT AND CONVENIENCE on the ground... better and safer flying... that's the win of Mr. Martin's efficient management at Patrick Henry Airport.

DEPENDABLE MAINTENANCE and repair facilities...conveniently located hangars...a good restaurant...and frequent courteous service to Williamsburg and nearby communities, are examples of the service you can expect whenever you land at this modern airport.

AND SPEEDY SERVICING with high-quality *Euro Aviation* Products is an important feature at Patrick Hwey, too.

PROVED BY MORE than 40 years of actual flying... backed by continuing research in one of America's

largest and most modern aviation petroleum laboratories. . . . Enco Aviation Products are famous for dependable performance!



FOUR FOUR FOUR FOUR FOUR FOUR FOUR

TWA ...
Only scheduled U.S. airline
direct to
ROME

At these special fares, all across Italy Year tours
for Your Travel Agent or Call Travel World Airlines

Across the U.S. and overseas... you can depend on **TWA**

FOUR FOUR FOUR FOUR FOUR FOUR FOUR

The Tougher the Better!

The tougher the installation—the longer the life of Thermocouple Lead Wire.

Our recent innovation, continuous high temperature plastic with bonded fiberglass outer Thermocouple Lead wire that:

- Resists Improved Microclimate
- Resists Abrasion
- Resists Moisture

Are Unaffected by
Most Chemicals
Sealed in Sheath
Available in All Standard
Thermocouple Materials

Always consult Thermo Electric for your
Thermocouple and Thermocouple
Lead Wire for Catalog C.

Thermo ELECTRIC CO.
RIVER LAWN, N.J.



TUNE THE RECEIVER . . .

and within the correct limits, follow
this course. That's all there is to it.
Nothing more you can do. That's why
you want Narco's and not any other make.

Only Narco controls quality, size of
production and consistently lowest
prices. Because:

MADE IN QUALITY—LOW IN COST
Narco Engineering Co. of S.A. 1932,
1934-1935

West Coast Representatives:
THE LEE SMITH CO.
P. O. Box 11111, Los Angeles 45, Calif.

narco
NATIONAL AERONAUTICAL
CORPORATION
WINDY FIELD, AMESBURG, PA.

Considering only the 360-day continuous endurance test, a comprehensive electronic instrument exhibited the least changes in dimensions, and a proper plastic laminate showed the smallest changes in flexural strength in the three tests.

► **Change in Weight**—In all three tests the weight changes of the majority of the laminates were less than 1.0 percent in the cyclic test, and did not exceed 1.5 percent after 360 days of continuous immersion. The largest weight changes were usually experienced with immersion in toluene.

With a few few exceptions, the length and width changes after either the cyclic or the 360-day immersion of the bulk did not exceed 0.1 percent. In both types of test the changes in thickness were found to be not more than one percent.

The best weight and dimensional stability in all three tests in the cyclic test was observed with the glass-fiber reinforced-polyester laminate.

After the 360-day immersion test, in the majority of cases the weight and dimensional changes for the samples that were tested immediately were equal to or higher than those that were reconditioned before testing.

► **Flexure Data**—Changes in flexural strength for the cyclic test and after the 360-day immersion test were, in most cases, negative. However, the losses were not over 30 percent for all of the samples.

The changes in flexural modulus of elasticity were, in the majority of cases, negative in the cyclic and the continuous immersion tests. In the cyclic test, losses greater than 10 percent were shown only by the cotton-linen anisotropic-polyester sample.

After 360 days of immersion, an increase greater than 10 percent occurred.

► **General Information**—Since there may be appreciable differences in the properties of individual sheets taken from the same batch, in different batches made by the same manufacturer, and even in similar laminates made by different manufacturers, only general information about the different types of laminate can be drawn from the value analysis.

No single sample exhibited maximum changes in all of the properties, under the different conditions of immersion and with the three different tests used in the test.

Sandwich Trouble

Asken as finding that sandwich-type flooring material has not proved satisfactory in many installations.

The upper surfaces normally are too weak to withstand highly concentrated loads (such as those imposed by bare soles or high-heeled shoes). Once

delamination occurs between upper surface and reinforcement, it spreads rapidly and some large areas are affected.

A factor which may be contributing to delamination is the infiltration of water at joints used in closing up at the aircraft.

Two types of flooring have given no collect service. Free ply-lin plywood (typical under ply and bamboo material) has held up well in Coast-to-coast, while Eastern Air Lines has experienced little trouble with a conventional laminated flooring material in the upper surface of which is mounted a thin sheet of Coromold. This type of flooring will be installed in EAL's newly purchased Martin 4-4's.

Ignition Systems Meeting Held

London—The sparkplug was blamed for the majority of all engine engine servicing time when representatives of 15 air carriers operating into Europe met here recently for the first European conference on aircraft ignition systems. Sponsored by Longfin, Ltd., of Rugby, England, the meeting brought together the carrier's engineers and representatives from manufacturers of sparkplugs, ignition equipment and aviation fuel.

► **Discussion Summary**—Major points stressed in the paper and discussion that followed seemed to point toward a list of requirements to be met by ignition system manufacturers. For example:

- **"Non-metallic"** spark plugs, good for the complete engine life, were suggested by R. W. Farns, TCA.
- **Good timing of plugs** is apparently unavoidable, so the great need is for lead-reversing compounds. No satisfactory material for this purpose has been found, according to F. R. Batts, Armstrong Whitworth Corp.
- **Low-tension ignition systems** were generally agreed to be superior to the high-tension types from the viewpoint of sparkplug life and radio interference.
- **Master recommendations** on ignition hardware include more operation, an associated controlled ventilation of the burner.

The Royal's Thomas Hinson engine analyzer is not in service in the Soviet version, because of its difficulty in diagnosis of low-tension trouble, discussion indicated.

As in Air Transport Association's recent Engineering and Maintenance Conference at Kermanshah University, Waco, Tex. (7), speakers agreed the development of a plug tester that would measure wear closely related operating conditions.

Bendix-Skinner

ORIGINATOR OF MICRONIC FILTRATION

the *Finest*

Defense Against Clogging and Wear



There can be no more demanding job for filters than in today's high speed, long range planes. That's why manufacturers and the U. S. A. F. turn to Bendix-Skinner filters. They know from past experience, as well as current operational records, that new times out of ten Bendix-Skinner filters will supply the "best" answer. Why not let Bendix-Skinner filters solve your problems too?

Over 350 Models providing filtration from 1 micron (1/250,000 in.) up to 1000 microns (1/25 in.).

200-A type 200-B type 200-C type

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Bendix-Skinner Division, 1000 E. 17th St., N.Y.C.



ECONOMY POINTS TO

CORALOX

AC's patented insulator, CORALOX, boasts a long list of features that make the AC-181 today's best buy in Aircraft Spark Plugs.

Less "doodling" and fewer off-schedule changes result from two great AC features. (1) The one-piece CORALOX insulator, and (2) the gap-retaining platinum electrodes. These two features reduce coil loading

and gap adjustment to the very minimum. The AC-181 saves you man hours. It saves you fuel. It wipes out the initial cost in short order.

Look at the diagram below and you'll see many other reasons for AC-181 superiority. It's approved by CAA and Pratt and Whitney for use on the big T & W engines.



- 1 One centered gap
- 2 One-piece insulator
- 3 Platinum CORALOX
- 4 No lead-in wire
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SALES & SERVICE



HILIOPLANE prototype shows its ability to slow-land in a mean-while loop.

Novel Sales Plan for Helioplane

Television-style repair and maintenance scheme will be offered for the new slow-landing craft.

Reveal time table for marketing the first place Helioplane calls for the first commercial plane to be ready for sale, including CAA certification, by Aug. 1.

A novel aircraft manufacturing plan is being prepared for the Helioplane. Dr. Louis L. Ballenger, chairman of the Helioplane, and Harvard University analyst of aviation business methods, plans to sell the Helioplane First under a repair and maintenance service guarantee. After it is built, it is a package deal, similar to that used for home television service.

Plans will be priced "somewhere between \$7000 and \$8000," but will be comparable in structure to other aircraft sales. The Helioplane is in the \$10,000 and up class, Helioplane Aircraft Corp., New York, Mass., states.

Start Teleset.—The manual airplane is designed to make safe landing and takeoff in an area no larger than a tennis court. Its great operation will eliminate airplane noise sources.

Service Plan.—First sales will be confined to a few initial areas. A service center will be opened in each area before the plane is marketed there. Expenses in additional areas will follow the opening of more service centers.

By using this plan, the plane owner will have no responsibility for maintenance, except to keep his Helioplane good and aloft. The rest is up to the

service operation, under the service contract. The airplane will get regular inspection, preventive maintenance and first certification of factory authorized components and modifications.

The dealer will take the prospect of a steady flow of service work. Such a steady assurance of enough money to keep him going," Ballenger forecasts.

The company says the production first place Helioplane will be a light-wing design, with full complete structural wing and control surfaces. Steel tubing fuselage will be covered with airplane fabric compared with a new fabric material. It will be greatly improved, the Helioplane forecasts.

Cost Reduction.—A Continental C-145 engine will supply the power, turning an 11 ft diameter Anzures propeller at a gear reduction of more than 1:1 between engine and propeller gear. A set of rubber V-belts will make the gear reduction possible without an elaborate, heavy gear box. Similar gears will be used successfully in the smaller Helioplane prototype, and the Helioplane forecasts.

A second NACA report dates out of 10 V-belts on a drive on the modified Piper Cub used in the noise reduction experiments by Aeronautical Research

Foundation. The report showed that during 1948 in operation including 620 flights, one set of belts were used. For the last 54 of operation only one of the 10 belts were in use, with little performance drop noted.

Dr. Ballenger expects the V-belts will be replaced under his service plan, and replaced periodically as they show signs of deterioration.

Aviation To Make Them.—Aviation Aircraft Corp., Middletown, Ohio, will manufacture the production Helioplane after the first lot of two which will be made at Norwood. The Helioplane will handle sales, research and engineering at Norwood.

Performance data quoted so far on the Helioplane says that it will fly or land at less than 10 mph and that it will cruise at less than conventional planes in the 145 to 165 hp category.

Slow flying characteristics are achieved principally by the large fin area on the plane, with the leading-edge wing area used to make the plane inherently approach and stallproof.

Large fin area, and air intake time to control in increasing windiness of the plane as a cargo carried at top.

Safety Features.—Two internal safety features are:

• **Standard belts** which are standard equipment in addition to regular seat belts.

• **Special heat-treated tubing**, highly resistant, is used in the cabin structure, for greater energy absorption without structural collapse in event of crash landing.

Landing gear appears conventional, but is designed to give the plane the advantages of a bicycle gear. Main wheels are steered as far forward as the nose wheel of a standard bicycle at maximum. Landing gear can be made as soft and, most or permanent, with lockers locked, the company states. This procedure has already been thoroughly tested on the two-place prototype.

Possibilities are now for the market at a lowest "stripped" Helioplane First for operators and remote area utility work. The manufacturer is evaluating the potential use without further a model.

BRIEFING FOR DEALERS AND DISTRIBUTORS

► **AIRPORT FARM PAYS OFF.**—The city of Clinton, Iowa, last year refunded over \$4000 in interest on bonds issued to pay off a farm. The farm was owned by a farmer and his wife, and was used as a farm.

► **GLIDDEN APPOINTS.**—Aviation, Inc., has been named distributor of the Glidden Co. Glidden Aircraft Division, Minneapolis, the new company, the U. S., in possession of and interests, Cuba, Mexico and Canada.

GIANT ALL-PURPOSE AIRLIFT!



C-124—smooth transport designed by Douglas—is the most versatile and flexible cargo and troop carrier in the air today.

Sixty-five of these sky giants are in production for the Air Force, with deliveries scheduled soon to Supply Squadrons of the Strategic Air Command.

Each plane is able to carry anything up to 50,000 pounds—diversified general cargo, 250 troops, or 94% of all military vehicles, fully assembled. This means that only a C-124 fleet can transport by air an entire standard infantry division, including all the millions of pounds of airlift required for its sustained equipment and support. The C-124 is also self-sufficient for rapid loading and unloading.

Furthermore, propeller-turbine engines can be readily installed in the current C-124 design, making possible more payload, longer range and greater speed.

LONG BEACH PLANT OF DOUGLAS AIRCRAFT COMPANY, INC.



DEPEND ON DOUGLAS

30th ANNIVERSARY YEAR



NEW AVIATION PRODUCTS



DECELOSTAT, complete with housing. VIEW of one ready to mount on wheel.

Decelostat Designed to End Skids

Westinghouse's new unit balances braking effort against rolling friction to prevent skidding.

An actual Decelostat, designed to make it possible for a pilot to skid the main landing gear wheels, has recently been developed by the Aircraft Division of the Westinghouse Air Brake Co., Wheeling, Pa.

Purpose and operation of this device are similar to the skid-rod attachment put out by the Boeing Airplane Co. and licensed to Radio Aut, Inc. (American West Aug. 15, 1949). Basic difference from the Boeing unit is in the supply valve control. The Westinghouse valve is controlled mechanically, the Boeing valve electrically.

One Decelostat unit, weighing 1.27 lb. and measuring approximately 6 in. in diameter by 1 1/2 in. in depth, is mounted on the inboard side of each landing wheel so that the centerlines of the wheel and Decelostat coincide. When the aircraft lands, the Decelostat acts with the wheel to which it is attached.

► **Skid Relief**—If the wheel commences to skid, the deceleration of the unit acts on an integral master wheel which, by driving pistons linked to a spool and shaft, operates a valve to relieve brake pressure and thus halt further skidding.

As brake pressure is relieved and deceleration rate lessens to the point where rolling friction is again greater than braking effort, braking pressure is automatically proportioned to confine the slow-down of the plane's momentum. By mounting the Decelostat valve at the brake, transmission time of a

signal is practically instantaneous.

The sequence of operation repeats automatically as often as necessary until the plane's momentum is low enough so that any degree of skidding is no longer possible.

The Decelostat may be installed in conjunction with either hydraulic or pneumatic landing systems, valves and other components for both systems being available.

Westinghouse Air Brake does not expect the Decelostat to pose any major maintenance problems, since the unit was designed along the well-established lines of comparable railroad equipment, which for years has been giving trouble-free operation.

Oil Additive

"Power Ball Friction-Proof Oil," lubricating additive represented to prolong life and greatly increase efficiency of machines and electric engines, cutting tools and other moving parts, is offered by Power Ball Oil Co., Inc., 911 Bluffs St., Columbus, S. C.

Company men state their oil is distinguished with new additive can withstand pressures that would only usually breakdown untreated lubricant and hence all moving parts. Other features claimed for product are its rust proofing, detergent and penetrating properties.

It rapidly used, Power Ball "one of their engine factory's electro-pumps bill for 5 to 15 percent," asserts the maker

These savings are claimed to be possible because of product's ability to increase horsepower yield by reducing wasteful machine friction.

Form further states that it is a non-corrosive, non-acid forming and has no harmful effects on either brass or non-ferrous metals.

Use of this product is reported to have boosted productivity of some lathes by as much as 150 percent. It is described as equally effective in a line shaft or diesel engine.



British Instrument

A landing gear position indicator which is stated to take up 15 percent less instrument panel space, is due to operate with glazed landing, and ground quacks, discontinuity for lamp replacement then governs British models is offered by Dwyer Equipment, Ltd., Chesham, England.

Unit has standard SAE case, is standardized by the Ministry of Supply for all British military and naval aircraft and has been approved by the Air Registration Board.

Instrument covers 9 spring-loaded lamps. Access to these is gained by turning screw at center of dial after which outer body of unit can be shown out from electric receptacle and lamps removed from back and indicators is weatherproofed to latest Ministry of Supply requirements. Including cable entry provision at back end, it is 4-6 1/2 in. long and 2 3/4 in. square. It weighs 0.5 lb. compared to 1 lb. weight of previous standard model.

Van Dusen AIRCRAFT SUPPLIES TOPICS

Perhaps the simplest way for us to learn to reduce the high, hidden costs of buying numerous accessories at scattered sources is to buy in bulk on the purchase, close at hand sources of stockpiled, reputable sources supply distributors.

Many airline purchasing agents realize the advantages of such purchasing. This is known by the increasing number of deliveries from Van Dusen's three warehouses (Glenview, Ill.; Torrington, N. J.; and Dayton, Ohio) to many of their major airlines.



J. W. Miller, President of Mid-Continent Aircraft Supply, also said G. A. Van Dusen, President of Van Dusen Aircraft Supply, said: "Mid-Continent, serving 39 cities in the mid-west, relies on Van Dusen for many supply items."

There are three distinct advantages in buying from Van Dusen:

1. Actual cost of parts sold is close to cost when bought from an aircraft supply house because of reduced handling and inventory cost.
2. Best working capital is kept up to large stocks in active stock rooms.
3. Costs of maintenance of parts is considerably reduced.

These are some of the reasons why foreign major airlines purchase from Van Dusen Aircraft Supply.

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Torque Wrenches

Line of 12 high-speed Protor torque wrenches has been announced by Protor Tool Co., Los Angeles, Calif. Wrenches are controlled by test, sound and sight.

A key lever is set at desired torque reading. When wrench is pulled to this reading, the lever trips a signal trigger. A strong impulse is supplied to the head and a loud click is heard, causing operator to release wrench at desired torque setting. Wrench also may read the dial and pointer on the wrench.

Maker points out that this design permits operator to work in blind spots, and light and center effect adverse conditions such as speed and accuracy. Wrenches have sturdy, aerospace, full-bore measuring element, and to be permanently accurate and undisturbable with normal use. Wrenches have capacities of 25, 50, 100, 150, 200 and 300 lb. ft. Other models have capacity limits of 300, 600, 1200, 1800, 2400 and 3600 lb. ft.

Lightplane Sparkplug

New unshaded, ceramic insulated, scratch spark plug, specially designed for use with Continental A50, A55, C75 and C85 engines, has been developed by The BG Corporation, 116 W. 52 St., New York 19, N. Y. Known as Model 706R, plug is approved by CAA and Continental Motors Corp.

Unit includes resistor which reduces gap erosion and permits plug to operate for long periods. Insulating material is aluminum oxide, used in platinum electrode plugs produced by firm. Plug also is available without resistor. This is designated simply Model 706 and is fully approved for flat-tops engines, according to BG.



Milling Cutter

A new type of inserted tooth cutter for slotting and side milling is offered by Leavitt Tool Co., Inc., Springfield, Vt. Designated Type S, this cutter features blades which are standard outside blades held in place with angle taper wedges. Maker says use of this type cutter reduces maintenance costs because of ease of setting, grinding and replacing the blades. Since there is no boring and steel does not have to be

ground, directed shocks only are required for sharpening.

Many blades can be inserted in the body even on small diameter cutters and large hole sizes can be made without changing the body. Design also permits extremely narrow cutters to carry inserted blades with complete rigidity. Company states it is easy to maintain highly accurate widths and diameters and cut cutter body can hold any grade of carbide blade for cutting any type of work. Cutters are available in widths from 1/4 to 1 in. and in diameter from 1 to 3 in.



Spotwelder Control

An precise operation of conventional, foot-controlled roller arm spot welder is offered through use of Weld-A-Matic control, produced by Weld-A-Matic Co., Inc., 12 S. Clinton St., Chicago 5, Ill.

Unit clamps to upper body of spot welder and operates on reduced air pressure at 15-20 lb., changing accuracy of all roller arm movements. Pressure is controlled by electric foot switch which can be positioned as desired on the foot. Switch operates a four-way operating valve. Equipment is designed for use in conjunction with any standard weld timer control and requires at least 6 cu. ft./min. air supply with a maximum of 90 lb. line pressure.

Molding Compound

Silicone molding compound specially suitable for current breakers, switches and other parts where resistance to impact and moisture test is required, has been developed by General Electric Co., Pittsfield, Mass.

GE says product is the first commercially available silicone molding compound. It consists of a silicone resin and glass fiber filler.

Designed to withstand temperatures as high as 702 F., compound also has high resistance. Material flows well in mold, does not support combustion.

In the final accounting

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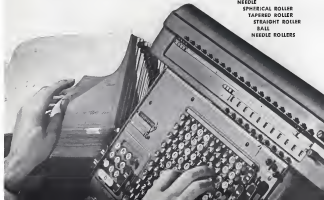


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Figure 1 *Mean (SD) age of onset of symptoms (years) by sex and symptom type*

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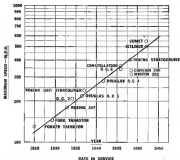
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Hales, Connolly and Forsyth prices, 18-89

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AIR TRANSPORT



JET TRANSPORTS such as the de Havilland Comet and Arco Comets Jetliner have limited maximum jetliner speeds 308,190 mph, but the development holds little immediate significance insofar as the military's strategic airlift potential is concerned. Military Air Transport Service will depend on its C-97s and C-124s through 1975. Above chart prepared by A. V. Roe Canada, Ltd., builder of the Jetliner, shows maximum speed of various aircraft models and the date they first went into use (scheduled to go in service).

MATS in No Hurry to Use Jets

Kuter sees turboprop versions of C-97 and C-124 as answer to military airlift needs for next five years.

By Charles Adams

Development of 500-mph. passenger transports such as the de Havilland Caravelle and Aero Canada jetliner has failed to dislodge a ripple of excitement among military authorities responsible

American pride and prestige may be hurt by foreign jet sales, but the damage goes no further, in the opinion of Maj. Gen. Lawrence S. Kuter, commander of the Military Air Transport Service. The military wants to see a lot more flying by its efficient jet bombers—such as the Boeing B-47—before yearning for substantial quantities of jet transports.

MATS is having military plants on the assumption that economics of air transportation will not support a reasonable collection of jet airliners until mass

important with regard to high-value strategic shift between now and 2033, Kater is still bullish about tobacco.

• **Turbo-prop Boosters**—"Speaking as an operator, not as an engineer, I believe turboprops offer the most promising means of improving strategic airlift efficiency in the next five years," Kuter told Aviation Week. "My opinion as an operator is that both the C-37 and C-124 could be adapted to use turbo-prop power with improvements in efficiency of each type alone."

(Boeing Douglas and Boeing are jockeying hard for military sales of turboprop versions of existing heavy-lift transports. Douglas (Aviation Week May 1) thinks it could fly a turboprop C-124 in about 20 months.)

MATS didn't start taking delivery on its petting-engines C-57A until last year, and C-124 deliveries have just begun. By 1955, Kater explained, the Stinsons and Glomasters may go half-way through the alphabet in model changes (just as the C-54A was developed through the C-94A). But even if turboprops are added, the boom ship will be the same.

MATS' total fleet of 295 four-engine aircraft (24 C-54s, 77 RC-119s, 10 C-124s, 68 C-47As, 10 Douglas C-74s and 7 C-47Bs) is unlikely to be exceeded in 1955 under current Department of Defense policy. However, as C-47s and C-124s replace C-54s on a one-for-one basis, MATS' airlift capacity will become limited.

time since 1955. In the interim, MATS took its Boeing C-97 StratoCruiser and Douglas C-124 Globemaster II (now cruising at around 500 mph) and its ragged C-54s (cruising at 240 mph) will be the backbone of its steel run fleet.

• **Quantity, Not Speed**—"Military requirements call for airlift in quantity—in terms of thousands of tons per day, several thousands of miles," the MATC commander explained. "We cannot have plans on small numbers of planes. Consequently, jet transports must be economically practical on the airframe for a considerable period of time before there would be enough of them to warrant serious consideration in military planning."

Kater looks for a considerable period of "debugging" on the Connet and Jet liner prototypes. While he believes these early jets will be of little use,

Katze is firmly opposed to "retooling" transport vessels to build up the reserve. He calls this procedure a "short-cut to obsolescence and a bar to instant readiness."

► **Transport Types Rated—MATS'** rating of the long-hauler which potential air-seal aircraft differs somewhat from the view of civil aviation officials. Whereas, conversely, the military sees a C-97A or C-124A as worth three C-141s, on an operational basis it rates a Globemaster II as equal to about five C-97s and a C-97 to slightly less than two C-141s.

Customs authorities, in estimating current ton-mile productivity at the Stratuscrane vs the DC-4, have followed the three-is-one basis, especially in view of the fact that airline utilization of the new Boreings has not yet reached a figure that could be considered normal.

The military attributes DC-6 lift capability on the long haul as equal to slightly more than two C-54s and the Constellation is equal to slightly less than two C-54s. Civil aviation officials

active in defense planning put the Comstar and DC-8 equal as in-miles payload, with low waste. Comstar has a flight advantage.

Kuter reminded his belief that the immediate confusion of the converter cut to feet in the military on M-Day is a jump. A recent survey showed only 15 percent of the mechanical force engine planes capable of carrying cargo efficiently, and only 10 percent were able to satisfy military range per kilometer ranges (2300 miles) according.

Modification Planning. MATS has already defined the structural changes required to fit civil four-engine aircraft to military needs, and has suggested methods of accomplishing the modifications. Detailed planning of how the conversion can best be carried out is now under active development within the Air Commanding Committee with extensive participation by civil and military agencies," Kuter told American War.

Northeast Airlines believes it could have its passenger Stratojets available for military cargo service in 48 hr. This would mean jacking up the short aircraft with wing supports. The reports would require frequent replacement and not permit operations in full efficiency.

While most of the relief planes would not be immediately available for effective military use, over 50 percent of the four-engine fleet could theoretically be made available to the military on M-Day, and 95 percent could be available within a week. Further, air line maintenance facilities are capable of 100 percent repairs—a significant factor in support of combined transport operations.

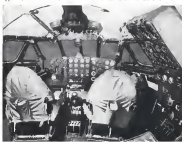
Decline in 1950. MATS figures list the increase in long-range civil routes 50 capacity between now and 1955. It thinks this would be true even if passenger demand for more concentrated operations were curbed in passenger C-54 operations (900 from MATS and 900 from the airlines) in the next four-engine aircraft which can effectively military planning in 1955. Even at 1955, plans were available to and fully available by the military, a major transport defect would still be apparent.

Kuter emphasizes, however, that he agrees with the Air Force's demand of improvement from between cockpit places and transports. "It is obvious," he declared, "that sustained mass employment of transport aircraft is a task possible with substantial control of the air. The first step would be to establish the ability to deploy the tactical strength of America's air power to build up the transport strength."

Personnel Shortage. Besides aircraft limitation, a serious shortage of navigators and radio operators exists in the

civil services. Kuter declared. He said that of 2216 total crews, only 65 percent could be manned with flight radio operators and only 35 percent with navigators.

Critical aspect of these shortages is apparent," Kuter stated, "since one



COMET'S SIMPLIFIED COCKPIT

This cockpit arrangement is in the British-built jet. The cockpit layout is based on the design by J. A. Birtley, United Air Lines' vice president operations, as the most visual he has ever seen as a large airplane. He said the simplification is partly due to the reduction in instruments and controls required for turbine engines and partly to

consider the fact that without such basic cockpit adaptation may be essential, and at ground communications may require redesign of voice transmission.

Airlines Renowned. Meanwhile, Kuter has assured the airlines that modifica-

tions of the nation's transport aircraft during wartime will not necessarily mean that domestic carriers must be stripped of all their four-engine equipment.

The MATS commander, in a recent talk before the Society of Automotive Engineers, took note of industry fears that the armed forces would subject a complete takeover of civilian commercial aircraft in an emergency (Aerospace Week Apr. 3). "If the two-engine commercial fleet should prove inadequate to meet domestic wartime requirements, those of us in an uniform would be the first to insist that four-engine transports be directed to meet long-range needs material to the national effort," Kuter declared.

However, the General expressed hope that the two-engine fleet could satisfy requirements. He voiced disappointment at persistence of the idea that there will be a risk of military and civilian air transport requirements during wartime.

Problem for Board. Asked whether progress is being made in arranging out remaining differences between active and military interests regarding modification planning, Kuter said he could not answer, since the problem is in the hands of the National Security Resources Board. "But under Mr. Starnes' chairmanship I would expect fast and effective action on matters pending before that board."

The MATS commander declared that it is not now, and may never be, possible to determine exactly what proportions of four-engine civil aircraft will be available to the military in an emergency. Civilian authorities have estimated that 35 to 45 percent of the total four-engine commercial fleet (now composed of 810 DC-6s, 250 DC-4s, 75 Constellations and 43 Stratojets) will be reserved with the domestic war fleet resources.

WAL Makes Bid for Western Feeders

Western Air Lines is making a serious bid to take over the feeder links now operated by West Coast Airlines and Southwest Airways.

WAL has asked the Civil Aeronautics Board to give it the former points either through acquisition of its parent or through purchase of Pacific Coast Route 65 or through certification of a new carrier. Western Air Lines of the Pacific, Inc., for a Los Angeles-Birmingham-Wash., route. Writers at the same time requested CAB to approve its stock ownership of Western Air Lines of the Pacific.

Merger Favored. The pending application of Southwest Airlines to take over the routes and parts of West Coast Airlines (Aviation Week Apr. 17) has

Western worried. It notes that the merged feeder system would serve about 70 cities in Washington, Oregon and California. This is nearly twice as many points as United Air Lines now serves in the same area, and more than five times as many cities as WAL serves in the three states.

The combined SWA-WCA feeder system requires additional runway or airport improvements, the threat of traffic diversion from the two trunk operators would increase. Western states Boulder, WAL says it can save the government \$100,000 to \$1 million annually in mail pay if it serves the points now certificated to WCA and SWA.

Shakedown Costs Put NWA in Red

Increased costs resulting from shakedown expense and low utilization of its new \$20-million fleet of Boeing Stratocruisers have put Northwest Airlines deeply in the red this far in 1950.

The carrier has reported a \$1,612,800 net loss for the first quarter of this year despite an unusual trend in cost-cutting. NWA hopes to show a substantial profit during the second quarter as the Stratocruiser utilization is increased and operating costs are reduced.

During January, February and March, Northwest's total operating revenues gained 14 percent over the corresponding 1949 figures. Domestic passenger revenues alone jumped 71 percent. But operating expenses soared from \$5,790,700 in first-quarter 1949 to \$11,661,500 in first-quarter 1950—thus canceling the revenue gain.

Costs Anticipated. President Clark Butler said the heavy costs of landing in the Stratocruiser had been anticipated by the company. During the shakedown period the full fleet of ten Stratocruisers went into operation last January, utilization of the double-decked transports averaged 4 hr. 30 min. daily. The average is now 6 hr. 45 min., with indications that there will be a further increase during the coming summer months.

Besides the Stratocruiser expense, reduced performance resulting from bad weather, and the Minneapolis-Moline DC-4 accident only in March, dominated traffic. Minneapolis is one of the heavily trafficked growing points on NWA's system, so the reaction to the mishap was unusually severe.

TAL Gets USAF Overseas Contract

The armed forces Executive Services Division of the North Carolina has been chosen since contract awarded to the commercial airlines.

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10

EDITORIAL

The Great Train Robbery

or

Our Self-Supporting Railroads

We have before us the Southern Railway System's new advertisement as Business Week for May 6. The rail have been pretty noisy for a long time about subsidies and how they don't have any. The ad is typical.

It says that of all the forms of money-economical transportation, only the railroads are self-supporting. "They don't have it to George," says the Southern.

George is you, Mr. Taxpayer.

"The railroads pay their own way . . . It can't say, especially when we have to compete for business with subsidized carriers. But it's easier on you and your pocket-book, George."

Frankly, to the contrary, it does look pretty easy to us, but if what we read in the truly Congressional Record is true, it definitely isn't easy on us as taxpayers "Georges."

For we started reading the fine print in the Appendix of the Record and after we got through some of the complaints of a certain Indiana Congressman we could positively feel you railroads rubbing our wallets.

It certainly smothered a lot of situations we Georges had built up in our minds from reading all those ads and press releases about how only you in the transportation world got some of those juicy subsidies.

Because Representative John R. Walsh contends that ever since the Railway Mail Pay Act of 1916 was passed you railroads have pocketed millions and millions of our dollars which the Post Office Dept. allows you for carrying empty mail cars all over the biggest railway system in the world.

One big reason, it seems, that you railroads can be so self-supporting is that we Georges paid you in 1966, for example, for carrying 558,442,192,219 cubic-foot-cubes on our local traffic route, and yet you really earned only \$23,677,944,295 cubic-foot-cubes. That means that in 1966, 44.24 percent of the space we're paying Georges paid for was not used. Even now, Mr. Walsh says, the government (meaning us Georges) pays about \$250,000,000 annually to you railroads for transporting mail, but we receive only half that service we pay for. This is because as you fellows know all along, you politicians—the 1916 act requires the same rate for the return of a mail-carriage car as was paid for its full off-haul movement, provided the car is not used by the railroad for other traffic on the return run.

To illustrate, Mr. Walsh introduces testimony in Potomac's General Donaldson's own words before the House Committee on Post Office & Civil Service:

"We . . . have it a difference to pay to railroads . . . I think what you are talking about is space purchased by full cars or through cars or whatnot. That's a difference from the regular RPO item, the lines in which railway paid circle space. Now with railroads in the space for transporting mail by full trains or by 15 feet or

30 feet or 45 feet or whatever, I think that our investigation indicated that we used about half of the space that we paid for. Under the law, if we transport a carload of mail from New York City to San Francisco we pay for that in such per foot per mile, so to speak, and then we pay for the return movement of the car, whether we use it or not. There is far more mail moving west than there is mail moving back.

After reading that, the rest of you Georges may like to know what the General Accounting Office told the Senate Post Office Committee about this particular manner in which the railroads self-support themselves out of our pockets. After its own study of the so-called round-trip provision of the act, it told the Senators:

"The study has indicated that our carrying full pay loads out to one extent or another, but our return movement to other use for the carrier's convenience and substitute can be arranged, making it possible for the railroads to realize a greater income. The property of this practice is a possible question since the act does not appear to anticipate such substitution . . . Many railroads can be returned in freight trains and the trip is paid for at passenger rates."

"The operation of the round-trip provision has resulted in numerous complex agreements, which cause the railroads full payment for all returned freight cars and empty space. In some instances the return movement is in advance of the scheduled freight movement."

This last idea is ingenious. This winkle extracts our money to buy empty space on the return portion of a round trip that hasn't started yet. How self-supporting can you be?

And C. B. Allen, a very capable news hawk, finds interest in the GAO's comment: "In practically all instances, the carrier is paid more by the Post Office for the return of a car empty than if the car was carrying a payload of a private shippers. Returning a car empty is to the railroad's advantage." (Especially if it can get paid for the return trip before it starts out.)

Two years ago, Mr. Allen reported as the New York Herald Tribune, the railroad post office practice matched the proportion of a minor wartime scandal when it was changed in government circles that the railroads had been operating empty cars back and forth across the country, despite an acute "shortage" of shipping space, to collect the higher mail pay rate.

Mr. Walsh, in a final word, says "The Post Office Department has permitted the railroads to abuse this provision of law in such a way as to increase greatly the amount of empty space paid for. While some empty returns must, under the law, be paid for, this has been turned into a racket by the railroads with Post Office Department approval."

So end today's lesson on how America's self-supporting railroads are the only form of money-economical transportation who don't still rely on help from the people's tax dollars. That's how the railroads are "easier on you and your pocket-book."

A Thought For Today

We are indebted to Life Magazine for the following editorial:

The U. S. government spends more every year to subsidize persons than it spends on developing guided missiles.

—Robert H. Wood



VERSATILITY

FOR Strategic AIRLIFT

Strategic airlift requires "around-the-clock" movement of critical cargo and personnel in large quantities to a given area. Full utilization of planes and space, plus the capacity to load and unload with timetable regularity—these are the demands for success in such operations.

The Fairchild C-119 is designed to meet the extreme demands of strategic airlift missions. Capable of carrying a 9 ton payload for 2000 miles, its huge baggage handles bulk loads with ease. Rapid loading and unloading of cargo is

readily accomplished through the huge rear loading doors and the truck-bed height of the square fuselage—features designed to do the job.

Built to perform multiple assignments, C-119s can deliver mobile hospitals, aircraft engines and spare parts, machine shops and maintenance personnel—a vast variety of storage items—where and where they're needed.

Little wonder the C-119, another Fairchild "first" in air transportability, sets the standard for VERSATILITY in modern aircraft design.

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ENGINE AND AIRPLANE CORPORATION
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... of air pours through this intake when the new North American F-95 is flying top speed. Yet the J47 turbojet inside handles this easily and operates reliably, efficiently, and without vibration.

The Air Force's newest interceptor, a stablemate of the speed record-holding North American F-86, is designed for the high speed, high-altitude flight necessary to knock down enemy fighters and bombers. Teamed together, the F-86 and F-95 provide both offensive and defensive air power. Both use General Electric J47 turbojets for high performance under tough conditions.

As the G-E TG-190, this same engine has been certified by the CAA as the first axial-flow turbojet suitable for commercial use. In tomorrow's commercial transports, the TG-190 can provide the same speed, comfort, and dependability that are today built into the fastest and most powerful Air Force planes.

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